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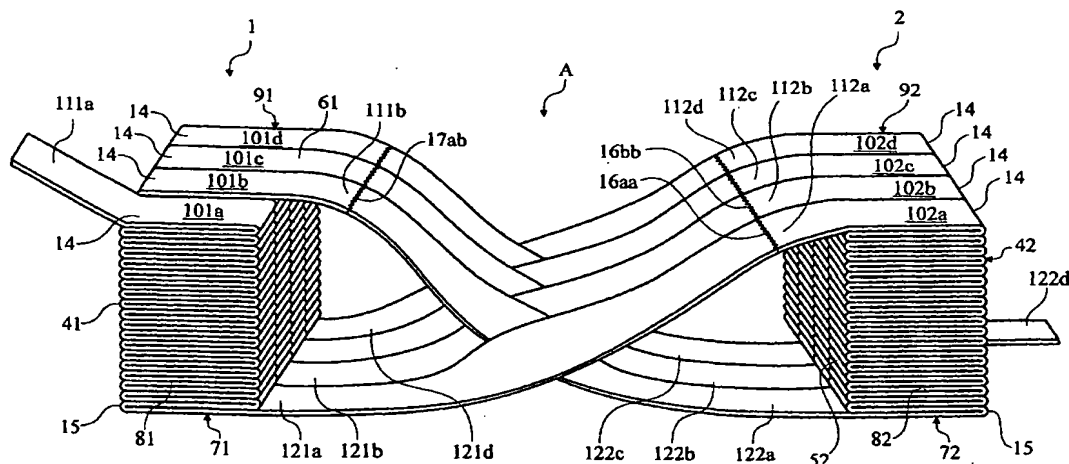
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(54) Title: ASSEMBLY CONTAINING STACKS OF A WEB OF MATERIAL



(57) Abstract: The invention concerns an assembly (A) containing a plurality of stacks of strip shaped material, which is fanfolded in the stacks between a leading end (111a, 112a) in a first end of the stacks and a trailing end (121a, 122a) in a second end of the stacks, and arranged to be able to be fed out through unfolding of the material continuously at least until the assembly has been emptied. The assembly contains two such packs (1, 2) each of which contains a plurality of such stacks (101a-d, 102a-d) arranged side by side. The leading ends and the trailing ends of the strip material of the stacks of the two packs are alternately joined to one another, so that a continuous strip is achieved with a leading end (111a) of the assembly in a first stack of one of the packs and a trailing end (122d) in a last stack of the other pack. The joined strip material sections between the trailing ends of the stacks of the second pack and the leading ends of the stacks of the first pack extend between the joined strip material sections between the trailing ends of the stacks of the first pack and the leading ends of the second pack. A plurality of such assemblies (A) may be spliced to form a multi-assembly.

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## ASSEMBLY CONTAINING STACKS OF A WEB OF MATERIAL

### TECNICAL FIELD

The invention concerns an assembly containing a plurality of stacks of a web of material  
5 which is fanfolded in the stacks between a leading end in a first end of the stacks and a  
trailing end in a second end of the stacks, and arranged to be able to be fed out by  
continuously unfolding the web of material at least until the assembly has been emptied.  
The invention also concerns the preparation of the assembly and a method for feeding  
out a web of material, including use of the assembly of the invention.

10

### BACKGROUND OF THE INVENTION

The invention has been developed with the primary objective to provide spliced strips  
intended to be included in a system for automatic manufacturing of disposable sanitary  
towels, napkins, and the like. In such products, layers of non-woven materials are  
15 included, which form a surface layer on the top side of the product. The starting  
material is strips of non-woven material, which are difficult to splice between one roll  
of material and another. Further, rolls have the disadvantage that they give a low degree  
of packing. Therefor, much "air" is transported from the strip manufacturer to the  
manufacturer of the sanitary towels or corresponding, and much "air" also fills storage  
20 and stock spaces, which is a drawback. It is therefor desirable that the packages of such  
strips are designed as parallelepipeds, which can be dimensioned so as to comply with  
international standards for transportation of goods.

It is known through GB 2 227 994 to arrange the strips in a parallelepipedic package in  
25 the form of stacks of folded strips abutting one another. According to this patent  
publication, the stacks are arranged closely together in cassettes, and the strips of two  
adjacent cassettes are joined to one another via a loop, but in such a manner that the  
strip-shaped web material, when being fed out, will be twisted half a turn when  
changing from one cassette to another. This is an inconvenience which possibly can be  
30 tolerated when the number of stacks is only two, as is disclosed in the embodiment of  
GB 2 227 994, but hardly if the package contains a greater number of stacks.

Further it is known through WO 98/58864, which discloses a pack/package consisting  
of a plurality of stacks of spliced strips abutting one another, to connect the strips of the  
35 stacks with one another through connecting strip portions between each pair of stacks  
abutting one another, such that the connecting strip portions are twisted 360° in a clock-  
wise direction in a twisting zone, whereby the thus continuous strip can be fed out by



successively unfolding the stacks without causing the strip to be twisted in connection with the changing of stacks. It is an inconvenience of this problem solution that the preparation of the pack/package, comprising twisting the strips, is comparatively troublesome to carry out.

5

#### BRIEF DISCLOSURE OF THE INVENTION

It is the purpose of the invention to provide a rational solution of the above mentioned problems, which can be achieved by means of an assembly of the kind mentioned in the above preamble, characterised in

- 10 - that the assembly comprises two units, here referred to as first and second packs, which packs have six pair-wise opposite sides, namely a pair of opposite fold-sides, comprising a first and a second side defined by the folds of the strip-material of the stack; a pair of opposite end-sides, defined by the ends of the stacks, one of the end-sides, here referred to as the third side of the stack, being defined by those ends of  
15 the stacks which are the leading ends when the strip material is being unfolded, while the opposite side, the fourth side of the pack, is defined by the trailing ends of the stacks, said third sides being turned in the same direction when the packs are oriented such that the first pack has a fold-side facing a fold-side of the second pack; and a pair of lateral sides, comprising a fifth and a sixth side, defined by the outer  
20 side of the outer stacks of the respective pack,
- that the leading end of one of the stacks of the first pack, here referred to as the leading stack of the first pack, is the leading end when unfolding the strip material of the assembly,
- that the trailing end of the leading stack of the first pack is joined to the leading end  
25 of a stack of the second pack, here referred to as the leading stack of the second pack,
- that the trailing end of the leading stack of the second pack is joined to the leading end of next stack of the first pack, which next stack lies next to the leading stack of the first pack in a chosen direction from one lateral side to the opposite lateral side,
- 30 - that the trailing end of said last mentioned stack is joined to the leading end of the stack lying next to the leading stack of the second pack in said direction,
- that the trailing end of said last mentioned stack is joined to the leading end of the next stack of the first pack, the trailing end of said next stack being joined to the leading end of next stack of the second pack, etc, comprising alternately connecting  
35 the leading and trailing ends of the stacks of the two packs up to and including the last stacks to be emptied through unfolding of the strip material of the packs,



- that the trailing end of the last stack to be unfolded out of the second pack is the trailing end of the strip material of the integrated assembly, and
- that the connected strip material sections between the trailing ends of the stacks of the second pack and the leading ends of the stacks of the first pack extend between the connected strip material sections between the trailing ends of the stacks of the first pack and the leading ends of the stacks of the second pack.

The above definition of the invention comprises the alternative that one or both of the leading stacks is not an outer stack. This not a favourable alternative but is possible per se. In this case, the outer stack, which is opposite the last stack in the said direction from one lateral side to the other, is the next stack of the pack to be emptied, if said last stack has been emptied and said outer stack on the opposite side of the pack remains to be emptied. This e.g. implies, according to the said alternative, that the trailing end of the outer stack of the second pack, in said emptying direction, can be joined to the leading end of the outer stack of the first pack on the opposite lateral side of the first pack.

However, the leading stacks suitably are outer stacks of the two packs, the outer sides of said outer stacks forming lateral sides which are turned in the same direction.

An effect which is achieved with the assembly of the invention is that the strip material does not twist as it is fed out from the assembly. If the first sides of the packs, defined as those fold-sides which comprise the first and the last fold of the stacks, are turned in the same direction, when said first sides are parallel and said fifth sides and sixth sides of the packs, respectively, also are turned in the same direction, the strip material, however, will "change face" at each change from one stack to another as the strip material is fed out of the assembly. To "change face" in this text means that the opposite side of the continuous strip material will face the viewer when there is a change from one stack of one of the packs to a new stack of the other of the two packs. This has no importance if the two sides of the strip material are identical and if the cross section of the strip material is uniform. In the opposite case, e.g. if one can say that the strip material has a top surface and a different bottom surface, it is, on the other hand, an inconvenience.

The above mentioned inconvenience concerning "face change" when changing between stacks of the two packs can be eliminated in at least two ways, which are included in the invention. According to one of these ways, the strip material is twisted half a turn, in



other words 180°, about its longitudinal axis in each connection between the stacks of the two packs, alternately in one and the other direction.

5 According to an other way, which is a feature of the most preferred embodiment of the invention, the said inconvenience is eliminated therein that one of the packs is turned 180° about an axis extending between two opposite sides of the pack, so that the first or the second sides of the packs, preferably the second sides, face one another, when the sides facing one another are parallel and said fifth and said sixth sides, respectively, of the two packs are turned in the same direction. According to this embodiment, the  
10 connections between the stacks of the packs are not twisted about their longitudinal axis, which facilitates the preparation of the assembly substantially.

It shall be pointed out that the invention, although it has been developed for the purpose of providing a continuous web of strip-shaped material intended to be included in a  
15 system for the automatic manufacturing of disposal sanitary towels, napkins, and the like, is not restricted to that application but may have a general use. For the present application, the strips may have a thickness of about 1 mm and a width of about 90 mm. The term "strip", however, shall not be imparted any restrictive meaning but include all forms of web-shaped materials, where the width considerably exceeds the thickness,  
20 including e.g. strips or bands of paper, paper board, fabric, felt, metal and plastic foil, etc.

The preparation of the assembly according to the invention includes orientation of the units/packs in any of the modes which have been mentioned above, which according to  
25 the preferred embodiment means that the packs adopt the turned position relative to one another according to the foregoing, and also the alternating connection of the end sections between the packs according to any of the principles mentioned above. The technical performance of the joints can be accomplished in many different ways. At least in the case the strip material consists of a non-woven material, the joint can be  
30 established by a sewing machine, suitably by establishing a continuous stitch, which extends over all the strip section connections between the packs, whereupon the stitch is cut off between the individual joints. Other joining techniques are gluing, heat sealing, welding, stapling, joining by means of adhesive tapes, as well as other techniques adapted to the strip material in question.

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At the same time as the strip-shaped material is fed out, e.g. in a feeding unit of a machine for some kind of conversion of the strip material, by pulling the material,



starting in the said leading end of the assembly, a new assembly may be installed in the feeding unit, and the trailing end of material of the assembly which is being fed out may be joined to the leading end of the new assembly. In this way a completely continuous feeding is made possible, i.e. without interruptions because of change of assembly.

5

The preparation of the assembly is suitably carried out before it is placed in the machine where it shall be unfolded. In order to facilitate transportation and handling of the prepared assembly, it is suitably provided in some kind of wrapping, cassette, or other casing, or is maintained assembled by means of surrounding tape, strings or the like.

10 Suitably, said casing or other enclosure is designed so that at least the leading end of the strip material of the assembly is easy to access for the connection of it to the trailing end of a foregoing assembly which is being emptied, before the casing, the tape or corresponding is disrupted. According to a conceivable embodiment, the assembly is prepared already by the manufacturer of the strip-shaped material or at a distributor's  
15 facilities.

One may also conceive that a plurality of assemblies of the above mentioned kind are joined to one another in advance, i.e. so that the trailing end of a first assembly is joined to the leading end of a second assembly, the trailing end of which is joined to the  
20 leading end of another possible assembly, and so on, so that a chain of interconnected assemblies is established. These interconnected assemblies are suitably provided in a common casing, cassette or the like, or are packed together by means of tape, strings or corresponding to form a multi-assembly, which can be transported, handled and entered into the feeding unit of the machine or other device where the strip-shaped material  
25 shall be unfolded. It is understood that a multi-assembly of that type, which has a leading end and a trailing end, can rationalise the handling still further.

Other features and aspects of the invention are apparent from the patent claims and from the following detailed description.

30

#### BRIEF DESCRIPTION OF DRAWINGS

In the detailed description of the invention, reference will be made to the accompanying drawing, which in a perspective view shows the principles of a preferred embodiment of an assembly according to the invention.

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## DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

A prototype embodiment of an assembly A according to the invention is shown in the drawing. It consists of two essentially parallelepipedic units, in this text referred to as a first pack 1 and second pack 2, the shape and size of which may be adapted to international standards for transportation. Each pack consists of a plurality (more than two; equally many in each pack) of parallel stacks abutting one another, of strip-shaped material, which is folded in a fanfold manner between the ends of the stacks. With reference to the direction of feeding the strip material from the packs, the first folds in the stacks are designated 14, while the last folds are designated 15.

The first stack of the first pack 1 is designated 101a, the second stack is designated 101b, etc. In the illustrated case, the case contains four stacks. The last stack of the first stack is designated 101d. In the second pack 2, the stacks are correspondingly designated 102a, 102b, 102c and 102d in order from the first to and including the last stack of the pack.

In each stack, the strip material has a first end, here referred to as leading end, in one end of the stack and a second end, referred to as trailing end, in the other end of the stack. In the illustrated case, the leading ends are positioned on the top side of the packs and the trailing ends on the bottom side. The leading end of the first stack 101a of the first pack is designated 111a and the trailing end is designated 121a. The leading end and the trailing end of the second stack 101b are designated 111b and 121b, respectively. The leading end and the trailing end of the last stack 101d of the first pack consequently are designated 111d (not shown) and 121d, respectively. The leading ends and the trailing ends of the second stack 2 are correspondingly designated 112a, 122a, 112b, 122b, 112c, 122c and 112d, 122d.

Each pack 1 and 2 has six pair-wise opposite sides. As far as the first pack 1 is concerned, these sides consist of

- a pair of opposite fold-sides, comprising a first side 41 defined by those folds of the strip material of the pack which include the first folds 14 and the last folds 15 of the stacks 101a-101d, and a second side 51 opposite to the first side 41,
- a pair of opposite end-sides, comprising a third side 61 defined by the first, upper ends of the stacks, and a fourth side 71 which is opposite to the third side and defined by the second, lower ends of the stacks, and
- a pair of opposite lateral sides, comprising a fifth side 81 and a sixth side 91 (hidden), defined by the outer sides of the outer stacks of the pack.



The six pair-wise opposite sides of the second pack 2 in an analogous manner are denominated first side 42, second side 52, third side 62, fourth side 72, fifth side 82 and sixth side 92, respectively.

5 One of the packs 1 and 2 is turned 180° about a conceived axis, which extends at a right angle to and between two of the opposite sides of the pack, so that, according to the embodiment, the first sides 41 and 42 of the packs will be turned in opposite directions in the assembly A. The second sides 51 and 52 consequently will face one another, when these sides are parallel. However, also the other way around is possible, but less  
10 suitable, i.e. that the first sides 41 and 42 will face one another and the second sides 51 and 52 will be turned away from one another, when said sides are parallel. When the packs are arranged in any of the said manners, suitably in the first mentioned manner, which is shown in the drawing, the trailing end 121a of the strip in the first stack 101a of the first pack 1 is joined to the leading end 112a of the first stack 102a of the second  
15 pack 2 without twisting of the thus joined strip material between the packs. The joint between the strip materials of the stacks 101a and 102a is designated 16aa. The joint between the strip material of the stacks 102a and 101b is designated 17ab. The trailing end 121b of the second stack of the first pack 1 is joined to the leading end 112b of the second stack of the second pack, i.e. in the same mode as the first stacks are joined to  
20 one another without twisting of the strip material. The joint between the second stacks 101b and 102b is designated 16bb. The joined strip materials which connect the first stack 102a of the second pack 2 and the second stack 101b of the first pack 1 with one another thus extend between, on one side, the joined strip materials which connect the first stacks 101a and 102a with one another, and, on the other side, the joined strip  
25 materials which connect the second stacks 101b and 102b with one another.

In an analogous way, the strip material between the stacks of the two packs are alternately joined to one another, without twisting the material, all the way to and including the last stacks 101d and 102d. What remains is finally the trailing end 122d of  
30 the strip material of the last stack 102d of the second pack. This trailing end 122d constitutes the trailing end of the joined strip material of the integrated assembly A.

Discharging of the assembly A is performed by pulling the strip material, starting in the leading end 111a, which beforehand may have been joined to the trailing end of a  
35 previous assembly, which is being emptied. By unfolding, first the first stack 101a of the first pack 1 is emptied/discharged. Since the trailing end 121a is joined to the leading end 112a of the first stack 102a of the second pack 2, said second pack 102a



then is discharged while pulling the strip material is continued. Successively, the stacks are discharged alternately from pack 1 and pack 2 without twisting the strip material about its longitudinal axis, until the assembly has been emptied. Meanwhile, the trailing end 122d of assembly A is suitably joined to the leading end of a new assembly that  
5 shall be discharged, unless the assembly A does not form part of a major multi-assembly (see above), in which the ends of the assemblies already are joined to one another to form an interconnected material which runs continuously through the entire multi-assembly.

10 It should be understood that the assembly A, which is shown in the drawing and described above, is intended to illustrate only the general principles of the invention. Naturally, the assembly A need not be oriented as is shown in the drawing, but may very well be raised vertically or be turned down on its side, etc, depending on what is most convenient in any specific case. Nor need the packs 1 and 2, and should not, be  
15 arranged at quite a distance from one another, but instead be arranged such that they abut one another in order to save space. The only reason why they are shown at a distance from one another in the drawing is to visualise how the strip material runs between the different stacks of the packs. It is per se possible to direct the third 61,62 or fourth 71,72 sides of the packs towards one another, or to direct e.g. the second side 51  
20 of the first pack 1 towards the third 62 or fourth 72 side of the second pack, just to mention a few variants. What, however, is important and not contradictory to the said variants, is that – in the case that the first sides of the packs are parallel – the first 41,42 and the second 51,52 sides of the packs are turned in opposite directions, i.e. towards or from one another. It should therefor be understood that the shown, relative orientation  
25 of the packs of the assembly has been chosen, not only because it is advantageous, but also in order to describe the general principles of how the strip materials of the two packs are joined to one another in a mode which allows the assembly to be discharged without twisting of the strip material.

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## PATENT CLAIMS

1. An assembly containing a plurality of stacks of a web of material which is fanfolded in the stacks between a leading end in a first end of the stacks and a trailing end in a second end of the stacks, and arranged to be possible to be fed out by continuously  
5 unfolding the web of material at least until the assembly has been emptied,  
c h a r a c t e r i z e d i n
- that the assembly comprises two units, here referred to as first and second packs (1,2), which packs have six pair-wise opposite sides, namely a pair of opposite fold-sides, comprising a first (41,42) and a second (51,52) side defined by the folds  
10 (14,15) of the strip-material of the stack; a pair of opposite end-sides (61,62,71,72), defined by the ends of the stacks, one of the end-sides, here referred to as the third side (61,62) of the stack, being defined by the leading ends (111a-d,112a-d) of the stacks when the strip material is being unfolded, while the opposite side, the fourth side (71,72) of the pack, is defined by the trailing ends of the stacks, said third sides  
15 being turned in the same direction when the packs are oriented such that the first pack has a fold-side facing a fold-side of the second pack; and a pair of lateral sides, comprising a fifth (81,82) and a sixth (91,92) side, defined by the outer side of the outer stacks (101a,101d,102a,102d) of the respective pack,
  - that the leading end (111a) of one of the stacks of the first pack (1), here referred to  
20 as the leading stack (101a) of the first pack, is the leading end when unfolding the strip material of the assembly,
  - that the trailing end (121a) of the leading stack of the first pack is joined to the leading end of a stack of the second pack (2), here referred to as the leading stack (102a) of the second pack,
  - 25 - that the trailing end (122a) of the leading stack of the second pack is joined to the leading end (111b) of next stack (101b) of the first pack, which next stack lies next to the leading stack of the first pack in a chosen direction from one lateral side to the opposite lateral side,
  - that the trailing end (121b) of said last mentioned stack is joined to the leading end  
30 (112b) of the stack (102b) lying next to the leading stack of the second pack in said direction,
  - that the trailing end of said last mentioned stack is joined to the leading end of the next stack of the first pack, the trailing end of said next stack being joined to the leading end of next stack of the second pack, etc, comprising alternately connecting  
35 the leading and trailing ends of the stacks of the two packs up to and including the last stacks (101d,102d) to be emptied through unfolding of the strip material of the packs,



- that the trailing end (122d) of the last stack to be unfolded out of the second pack is the trailing end of the strip material of the integrated assembly, and
  - that the joined strip material sections between the trailing ends of the stacks of the second pack and the leading ends of the stacks of the first pack extend between the joined strip material sections between the trailing ends of the stacks of the first pack and the leading ends of the stacks of the second pack.
- 2 An assembly according to claim 1, characterised in that the leading stacks are outer stacks of the two packs, the outer sides of which are lateral sides, which are turned in the same direction when they are parallel.
- 3 An assembly according to claim 1 or 2, characterised in that one of the packs is turned 180° about an axis extending between two opposite sides of the pack, so that the first or second side of the first pack faces the first or second side, respectively, of the second pack, when the two sides which face one another are parallel and said fifth and sixth sides, respectively, of the two packs, are turned in the same direction.
- 4 An assembly according to claim 3, characterised in that the second sides (51,52) of the packs face one another.
- 5 An assembly according to claim 4, characterised in that the strip material in the region of the connections between the trailing ends and the leading ends of the stacks of the two packs is not twisted about the longitudinal axis of the strip material.
- 6 An assembly according to claim 3, characterised in that the second sides (51,52) of the packs are turned in the same direction.
- 7 An assembly according to claim 6, characterised in that the strip material in the region of the connections between the trailing ends and the leading ends of the stacks of the two packs is twisted half a turn about the longitudinal axis of the strip material, alternately in one or the other direction.
- 8 An assembly according to any of claims 1-7, characterised in that the trailing end of the strip material of the assembly (A) is joined to the leading end of an additional assembly (A).

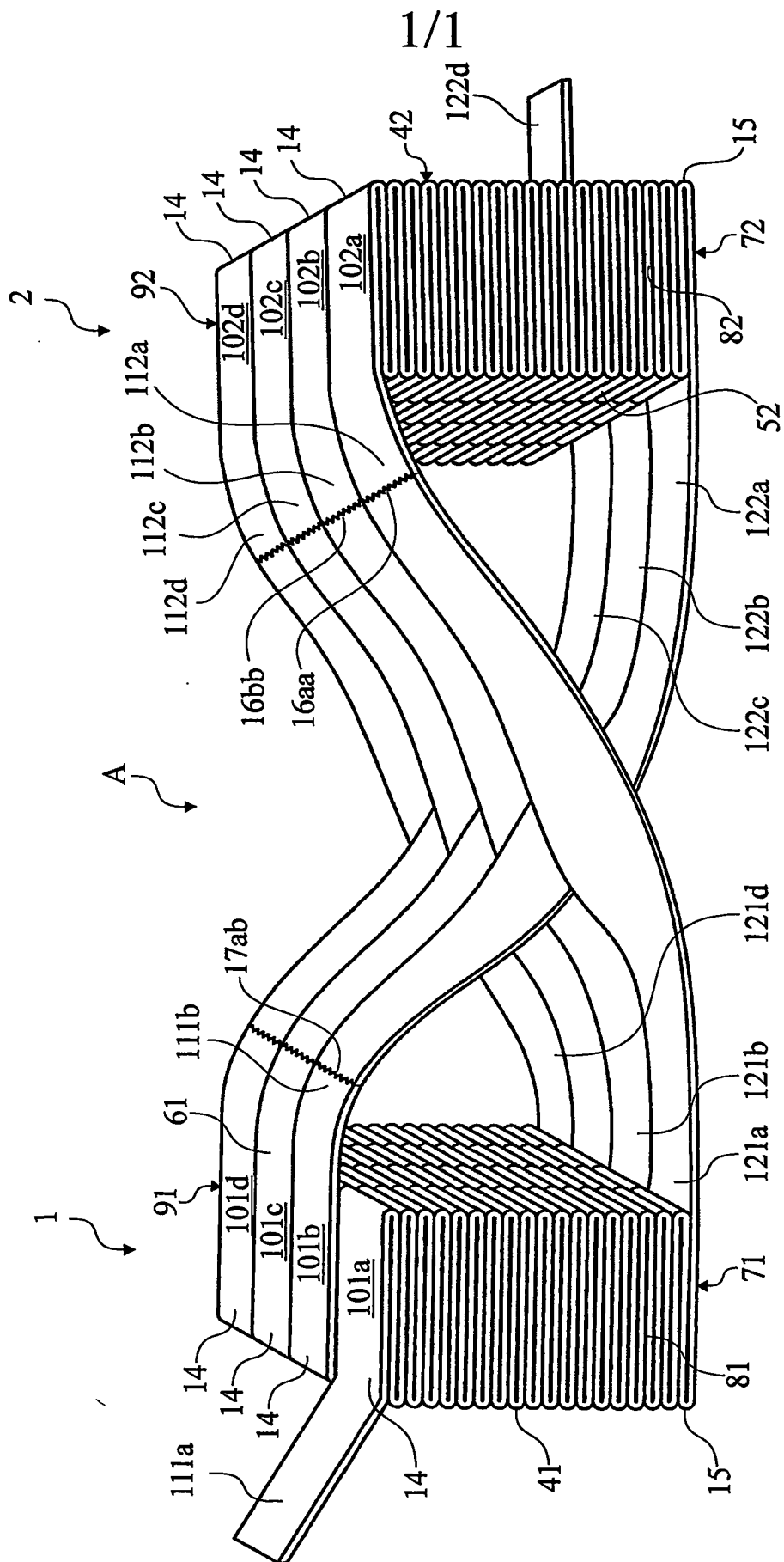


- 9 An assembly according to claim 8, characterised in that the assemblies (A) are included in a multi-assembly which contains a number of packs (1,2), which number is a multiple of two, however at least four packs.

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## INTERNATIONAL SEARCH REPORT

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According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)

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SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 19956846 A1 (GEVAS VERPACKUNGSMASCHINEN GMBH), 31 May 2001 (31.05.01), figure 1, abstract  -----	1-9

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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